

COLORADO RIVER RECOVERY PROGRAM
FY 2000 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 85

I. Project Title: Channel Monitoring to Evaluate Geomorphic Changes on the Mainstem Colorado River

II. Principal Investigator: John Pitlick, Ph.D.
Department of Geography University of Colorado
Campus P.O. Box 260, Boulder, CO 80309-0260
E-mail: pitlick@spot.colorado.edu
Phone: (303) 492-5906

III. Project Summary:

The project is designed to develop a better understanding of sediment transport and channel dynamics in the upper Colorado River to evaluate rates of channel change and geomorphic effects of coordinated reservoir releases and normal snowmelt flows. The study will identify the window of time of peak sediment delivery to the 15-Mile Reach. The study will also compare and contrast effects of augmenting flows on the ascending and descending limbs of the annual hydrograph. Detailed surveys of channel topography were conducted along a 1-km section of the 15-Mile Reach. Sediment traps, consisting of large tin cans filled with clean gravel, were placed at three sites in the 15-Mile Reach and at two sites in the 18-Mile Reach. Cross sections at the mouths of secondary channels and backwaters, that were first surveyed 5 years ago, were re-located and re-surveyed. The study will culminate in the development of a matrix, which can be used by the Coordinated Reservoir Operations group to tailor reservoir operation to target multiple objectives of habitat maintenance and creation.

IV. Study Schedule: Initial Year - 1998, Final Year - 2002

V. Relationship to RIPRAP: Colorado River Action Plan: Mainstem I.A.c.(3)(c)
Coordinated Reservoirs Operations.

VI. Accomplishments of FY 2000 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

2000 was the third year of this project. Field work again focused on effects of spring and summer flows on geomorphic processes in the 15- and 18-Mile Reaches of the Colorado River. Three separate tasks were undertaken during the 2000 field season:

(a) Measurements to assess spatial patterns of gravel transport and channel change were continued in the 1-km study reach near river mile 176. Prior to spring runoff, circular patches of gravel were painted with brightly colored spray paint to determine the extent of bed material motion in response to peak discharges. Particles within 1-meter areas were cleaned and painted without physically removing them from the bed. The patches were precisely located and photographed, then relocated and photographed after the peak flow.

Water-surface elevations at 11 established cross sections were also surveyed at the peak discharge. These data will be used to further refine 1- and 2-dimensional models of flow and boundary shear stress in the reach.

(b) Sediment traps consisting of large tin cans filled with clean gravel were periodically cleaned and replaced. These traps are being used to monitor the movement and infiltration of fine sediment (sand and silt) after the peak discharge. The traps were cleaned at intervals ranging from several days to two weeks. Sediment size analysis will be conducted at the USBR lab in Denver.

(c) High resolution (1:6000) color aerial photographs of the main stem of the Colorado River were flown in late summer in coordination with the USFWS Remote Sensing group in Albuquerque, NM. The photographs encompass the segment of the river from Rifle to Loma, CO. The timing and scale of the photographs were chosen to correspond with conditions in 1993 when similar photographs were flown.

Discussion of Initial Findings:

(a) Provisional streamflow data from the USGS gauge near Cameo indicate that the Colorado River reached a peak mean daily discharge of 15400 cfs (436 cms) on 5/31/00. Coordinated reservoir operations contributed to elevating peak flows, in spite of low runoff. Field evidence from the study site near RM 176, and other areas, indicated that these flows were high enough to move the gravel bed material, as predicted by previous hydraulic modeling results. Evidence for localized gravel transport included scour and fill at selected cross sections, movement of painted rocks, fresh gravels resting on top of the sediment traps, and missing sediment traps, i.e. a few of the sediment traps could not be found, presumably because they were scoured away.

(b) The sediment traps were cleaned several times on the receding limb of the hydrograph (from early June through July). Sampling over relatively short time intervals again revealed that fine sediment can fill the void spaces in the traps in only a few days, although this depends on the specific location of the trap. There also appears to be a transition in the size of sediment collected; sediment collected in the week or two following the peak is much coarser than that collected later on. The transition in sediment size presumably represents a change in transport mode, from sand moving as bed load to silt moving as suspended load.

(c) The color aerial photographs have been developed and indexed, and presently reside in the Grand Junction office. The photographs appear to be of extremely high quality and show many details of the river channel. Digital analyses of these photographs will proceed in the coming year.

Cross sections within a 1-km segment of the 15-Mile Reach near River Mile (RM) 176 were re-surveyed. This segment of river is being used for channel monitoring because it has a variety of active geomorphic features, and because it includes property on the south bank that was purchased by the U. S. Fish and Wildlife Service and the Bureau of

Reclamation. Water-surface elevations were surveyed here in early July, after the peak

discharge, and eight of the cross sections were re-surveyed in early fall with the river at base flow.

VII. Recommendations:

The findings of this work should be shared with the Coordinated Reservoirs team as soon as any definitive results are identified and documented. Currently the Principal Investigator meets with the CROP team twice a year to share results.

VIII. Project Status: Ongoing and on-track.

IX. FY 2000 Budget Status:

A. Funds provided: \$ 23,900
B. Funds expended: \$ 23,900
C. Difference: 0

X. Status of Data Submission: Cross section and sediment data will be made available to the Recovery Program library in June 2001.

XI.	Signed: <u>George Smith, for John Pitlick</u>	<u>December 8, 2000.</u>
	Principal Investigator	Date